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ETHNOMATHEMATICS IN MAKING WOVEN FABRICS IN THE SIPIROK COMMUNITY

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ABSTRACT

Ethnomathematics is one method of learning mathematics that is expected to be another alternative that seeks to make students interested in learning mathematics. Besides being theoretical, ethnomathematics teaches how mathematics may be employed in real-world circumstances. This study aims to understand more about how mathematics is used in the production of traditional Sipirok woven fabrics. The author employed a qualitative research method in this study, and the data was gathered through observation, interviews, and recording. One of the weavers of Sipirok woven fabric provided the sample. According to the findings, there is mathematics in manufacturing Sipirok woven fabric, specifically in the loom used and woven fabric motif. Thus, ethnomathematics can support students' mathematics learning and aid in understanding the teacher's instruction. It is suggested that other researchers study Indonesian cultures that incorporate ethnomathematics, as many unexplored Indonesian cultures remain.

ETNOMATEMATIKA DALAM PEMBUATAN KAIN TENUN PADA MASYARAKAT SIPIROK

Kata Kunci:

Etnomatematika
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Ulos batak

ABSTRAK

Etnomatematika merupakan salah satu cara belajar matematika yang diharapkan menjadi alternatif lain yang bertujuan agar siswa tertarik dalam belajar matematika, karena etnomatematika belajar bagaimana matematika bisa dipergunakan dikehidupan situasi dunia nyata selain bersifat teoritis. Tujuan dari penelitian ini adalah untuk mempelajari lebih lanjut tentang bagaimana matematika ada di pembuatan kain tenun khas Sipirok. Adapun cara yang digunakan penulis dalam penelitian ini adalah metode penelitian kualitatif, informasi yang dikumpulkan didapatkan melalui observasi, wawancara dan dokumentasi. Adapun sampel yang digunakan merupakan salah satu penenenun kain tenun Sipirok. Hasil yang ditemukan adalah terdapat ilmu matematika dalam proses pembuatana kain tenun Sipirok yaitu pada alat tenun yang digunakan serta pada motif kain tenun. Dengan demikian, etnomatematika dapat digunakan dalam mendukung pembelajaran matematika siswa agar dapat membantu dalam memahami pembelajaran yang di berikan guru. Disarankan kepada peneliti lain agar melirik budaya indonesia yang mengandung etnomatematika, karena masih banyak budaya Indonesia yang belum di eksplorasi.

1. INTRODUCTION

Mathematics education in formal educational institutions is a crucial endeavor undertaken by educational institutions to enhance the quality of education [1]. Educators conduct teaching while learning is undertaken by students, resulting in a two-way communication process [2]. Advancements in science and technology are leading human civilization into a new era, particularly in mathematics [3]. Mathematics evolves in response to the rapid changes of the times. Mathematics is crucial in various disciplines, as it is closely intertwined with nearly all scientific fields. It mainly aids in performing calculations in physics, chemistry, and other scientific domains. Mathematics is a discipline that evolves in response to the technological demands of society [4]. Hence, mathematics is an essential subject that should be included in all levels and types of education, tailored to the specific needs of each level and type of education. Mathematics is a field of study that falls under the umbrella of science and technology [5]. Mathematics is connected to conceptual ideas, and comprehending it requires strong cognitive abilities. It demands focus, determination, thoughtfulness, and motivation to grasp mathematical concepts [6].

Technological advancements in Indonesia have progressed rapidly. Certainly, technological advancements profoundly influence different facets of individuals' lives, encompassing culture. Culture is a learned behavior that humans acquire as members of society. It is not inherited biologically but rather acquired through the process of learning. The majority of human actions are influenced by cultural factors [7]. Culture encompasses the entirety of human activities, experiences, and creations. Culture encompasses the comprehensive array of human ways of life, such as knowledge, beliefs, art, morals, customary laws, abilities, and other acquired habits within a society [8]. Indonesia comprises 33 regions, each with distinct cultures that vary among clans. Consequently, it must possess a unique and identifiable cultural identity. The preservation of knowledge is ensured by sharing it with younger generations, preventing its loss over time.

Ethnomathematics is a concept that refers to the convergence of culture and mathematics. Ethnomathematics refers to the significance of mathematics within different cultural contexts. The culture being discussed refers to the current patterns of human behavior. This includes activities such as urban or rural gatherings, work groups, professional classes, students of different age groups, indigenous communities, and other similar associations [9]. Culture encompasses all creations of the human intellect. Culture is a product of human activity and is not observed in animals or plants, as they lack cognitive abilities [10].

Ethnomathematics is commonly linked to instructional approaches in mathematics that establish connections with indigenous cultural practices. Ethnomathematics is a field that explores how cultural practices can contribute to the development of mathematical learning [11]. Cultural practices facilitate the conceptual connection between mathematical concepts. Ethnomathematics aims to enhance students' proficiency in learning arithmetic by incorporating social insights [12]. Ethnomathematics is a field that explores the historical and cultural aspects of mathematics, providing new approaches to teaching the subject [13].

Numerous studies have examined ethnomathematics, including research on applying ethnomathematics in Malangan mask dance. The exploration of ethnomathematics in developing the Malangan mask dance reveals two components. The first component involves the angles formed by the movements of the dance, which include obtuse angles, acute angles, and right angles. In the Malangan Mask dance, three types of line relationships are observed in the movements: intersecting, parallel, and overlapping. The hand and foot positions of a dancer performing Malangan mask dance movements result in the formation of various angles and lines [14]. Another study discovered that Umbul Binangun in Taman Sari Kraton Yogyakarta incorporates mathematical elements, particularly in flat plane calculations [15]. The Umbul Binangun building uses flat geometric objects to enhance the study of geometry by providing visual examples.

Furthermore, it has been discovered that the Toba Batak Ulos woven fabric, utilized during wedding ceremonies, incorporates elements of ethnomathematics [16]. In addition, a separate study discovered several mathematical concepts while examining the art of traditional house building in Bagas Godang and its ornaments. These concepts include translations, cyclical group concepts, reflections, vectors, and different forms of plane geometry, such as squares, rectangles, and triangles [17]. Numerous studies examine ethnomathematics within different Indonesian cultures.

Ethnomathematics is closely intertwined with the daily lives of Indonesians, as it is present in nearly every aspect of their activities. Evidence of our ancestors can be found in various forms, including historical structures and traditions. Indonesia is home to various tribes, such as the Javanese and Malay tribes. Consequently, social norms differ across regions, including the Batak tribe. The Batak people unknowingly incorporate various mathematical applications into their culture. These applications can be observed in traditional houses [18], dance movements [19], musical instruments [20], traditional cakes [21], and clothing. The garments worn at the event are made from a traditional Batak textile known as Ulos or Songket. Songket is a traditional handwoven textile with distinctive patterns and symbolic significance. It is crafted using traditional machinery. Weaving is a solitary activity that requires advanced skills. The current interest in weaving is not limited to young individuals anymore. Due to work demands, only a few individuals possess the skill of weaving nowadays. The weaving process is performed using basic tools, specifically non-mechanical weaving tools. Initially, weavers utilized tools made from various types of large wood, commonly called karasak wood.

Additionally, kitchen wood sourced from the Tapanuli forest was also used. The technique used to create woven fabrics involves combining threads in transverse and longitudinal directions [22]. The craft product known as weaving is a fabric made of yarn (cotton, silk, etc.) by inserting the weft yarn into the warp transversely [23].

Previous studies have explored the field of ethnomathematics in various woven fabrics, such as the Ulos Batak Toba fabric [16], Oeolo fabric of East Nusa Tenggara [24], Southwest Sumba woven fabric motifs [25], Lipa Kaet woven fabric [26], and Bali woven fabric [27]. However, there is currently no research that specifically investigates the ethnomathematics involved in the production of woven fabrics by the Sipirok community.

This research aims to investigate the role of ethnomathematics in the creation of woven fabrics by the Sipirok community. This research differs from previous studies, focusing on the mathematical aspects of producing Sipirok woven fabrics. In addition to examining the motifs found on the fabric, this research also explores the tools and threads used in the weaving process and the marketing development of these fabrics.

2. METHODS

This research employs a descriptive qualitative research method. The data was collected using in-depth direct interviews and documentation [25]. The study focuses on the Sipirok community in Padang Bujur village, which is situated in the South Tapanuli region. The individuals in this community possess weaving skills and engage in weaving as a secondary occupation alongside their primary job. The research was conducted from March until its completion. This research was conducted in Padang Bujur village, Sipirok sub-district, South Tapanuli Regency, located in North Sumatra, Indonesia. Figure 1 illustrates the stages in the research process [26].

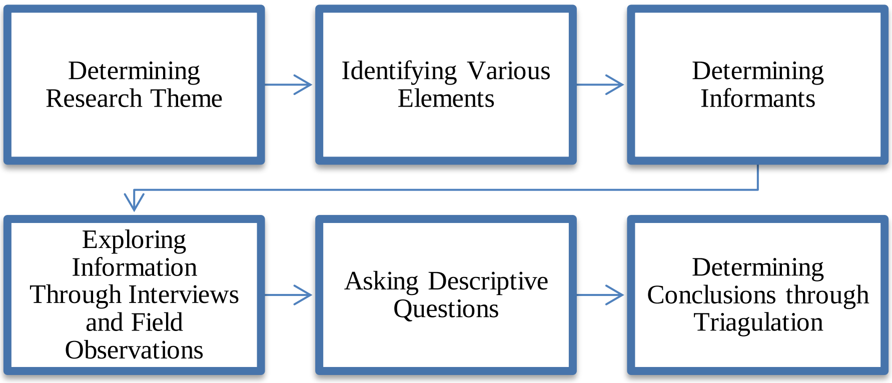


Figure 1. Research Stages

3. RESULT AND DISCUSSION

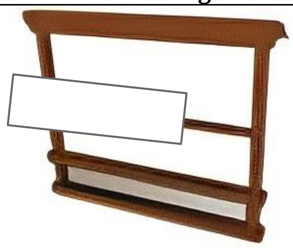
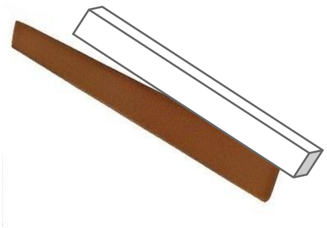
Ethnomathematics-based learning is employed to enhance student engagement in mathematics, particularly among students who initially perceive mathematics as challenging. The Sipirok community utilizes the process of creating woven fabrics as a form of ethnomathematics in their learning practices. Based on interviews with weavers, it is apparent that there is a pre-weaving process that needs to be completed before weaving activities can commence. This process involves several steps, including rolling the yarn (*menghani*), which can take an entire day, followed by purifying the yarn, which can take up to six hours. Only after these steps are completed can the actual weaving of fabrics begin. The weavers explained the motifs created, the required capital, and the selling price of the fabric. The weaving process involves mathematics in various aspects, including the tools used, fabric motifs, financial considerations, and sales. These elements can be utilized for learning mathematics.

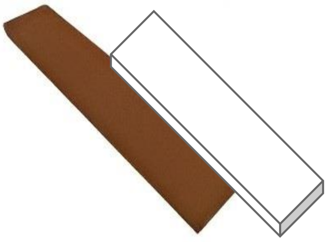
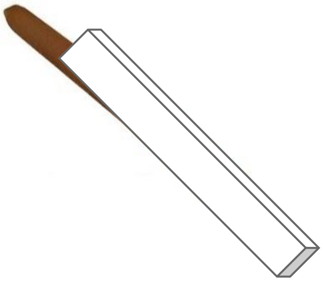
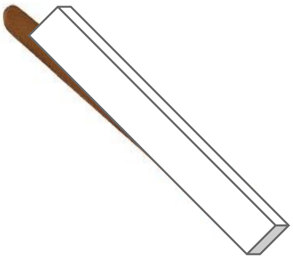
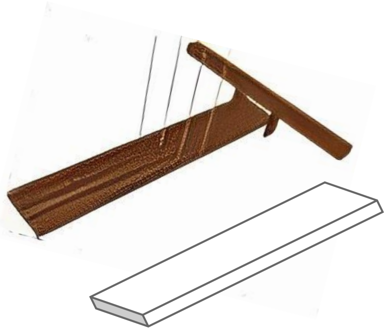
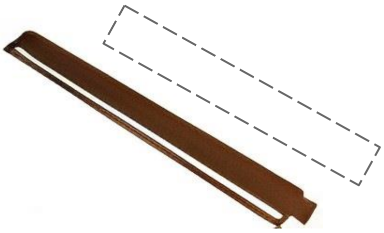
3.1 Tools

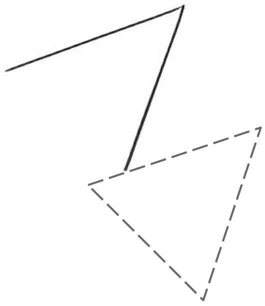
Figure 2. Non-machine Looms

The Sipirok community uses traditional handlooms to produce woven fabrics with distinct patterns. These patterns are varied, and human workers operate the looms manually. Upon examining the components of the non-machine loom, it becomes evident that it is constructed from assembled wooden parts designed to mimic a traditional machine. Here are the parts of a non-machine loom:

Table 1. Non-machine Loom Parts

No	Name	Image	Function	Identification
1	Front section comb		Sealing and compacting the weave.	Rectangle Has 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: $L = p x l$
2	Stopper		110 cm long wooden rod as a barrier to the front comb swing when the comb is forward.	Blocks Have 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: $V = p x l x t$
3	Side railing frame		The part supports the main side frame and the movement railing of the 4 center combs. It is made of wood with a thickness of 5 cm, with dimensions of 135 cm high and 30 cm wide.	Rectangle Has 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: $L = p x l$
4	Main side frame		The main support of each part that has an axis.	Rectangle With: 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: $L = p x l$
5	Side frame		A wooden beam with a length of 102 cm connects the two side frames to strengthen the tool's structure in supporting the load.	Blocks Have 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: $V = p x l x t$

6	Pedestal plane seating		Dimensions of the seating area are 110 cm long and 20 cm wide as a seat for the weaver.	Blocks With: 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: $V = p \times l \times t$
7	Front wooden beam		It serves as the last axis of the yarn movement groove before it reaches the last reel. The size of this beam is 7/7, with a length of 110 cm.	Blocks With: 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: $V = p \times l \times t$
8	Rotating axis		As a path of yarn movement after passing through the backcomb. It has a diameter of 5-7 cm with a length dimension of 102 cm pivoting on both side frames.	Blocks With: 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: $V = p \times l \times t$
9	4 pedal buds		The lower part serves to move the 4 center combs. The combs and the pedal are connected with a lever strap. The back of the pedal has a shaft, making it comfortable to step on. Each pedal has dimensions of 140 cm long, 8 cm wide.	Blocks With: 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: $V = p \times l \times t$
10	Backside comb		It serves to help organize the path of the thread so that it makes it easier while painting the motif on the thread.	Rectangular With: 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: $L = p \times l$

11	Mid-section comb		Consisting of a wooden frame with a height of 40 cm, a length of 90 cm, and a wire rope through which the yarn is woven. This comb can move up and down, controlled by a pedal lever under the machine.	Rectangular With: 4 sides 4 angles (90°) 2 axes 2 diagonals Formula: *L = p x l*
12	Rubber band		It stabilizes the swing of the front comb and pulls the front comb back to its original position after swinging forward.	Isosceles triangle With: 2 legs of equal length 1 base 2 equal angles Formula: *L = ½ x a x t*

The table provides information on mathematical activities involving geometric shapes found on non-machine looms. One example is the rectangular shape made of wood. Rectangles are a part of flat geometry and can be described using the formula: L = p x l. Additionally, we can locate wood with a block-like shape, which can be determined by its dimensions, specifically its length and width. Blocks are a specific type of geometric shape that exists in three-dimensional space. They possess certain properties, such as rectangular sides and equal-length diagonals. Each diagonal plane forms a rectangle. The formula for determining the volume is V = p x l x t, where p represents the length, l represents the width, and t represents the height.

One component of a non-mechanical loom that will be utilized is the side railing frame. This frame has a thickness of 5 cm and dimensions of 135 cm in height and 30 cm in width. The volume of the side railing frame is calculated by multiplying the dimensions of 135 cm, 30 cm, and 5 cm, resulting in a total volume of 20,250 cm^3. One component of the non-machine loom has a shape that resembles an isosceles triangle. An isosceles triangle is defined by two legs of equal length, with the remaining side referred to as the base. The angles formed by the legs are also equal. The formula for calculating the circumference of an isosceles triangle is obtained by adding the lengths of all three sides. The height of an isosceles triangle can be found by multiplying the length of one of the sides by half of the triangle's area. To determine the angles of an isosceles triangle = 180º - (2 x one of the base angle sizes).

3.2 Woven Fabric Motifs

Batak weaving holds significant cultural and social importance for the Batak or Tapanuli people residing in South Tapanuli, North Tapanuli, Simalungun, and Tanah Karo regions. It is not merely a regular fabric used for everyday wear but carries a distinct sacred meaning in their society. The Toba Batak people believe that each type of woven fabric, known as ulos, carries a specific meaning that reflects the cultural knowledge of the Toba Batak tribe [27]. Batak woven fabrics are essential for traditional events like birth ceremonies, weddings, deaths, and other rituals in the Batak community.

The Batak traditional woven fabric is not just a product of cultural craftsmanship but also carries significant meaning and symbolism through its colors and motifs. Batak woven fabrics hold significant meaning for certain individuals in the Batak community, representing emotions, social status, and interpersonal connections.

Figure 3. Sipirok Woven Fabric Motifs

Figure 3 depicts a representative example of Sipirok woven fabric. One of the motifs present in the fabric is the Angkar motif, which holds significance for the Batak community. According to Batak's philosophy, it symbolizes the importance of women's extensive knowledge and the ability to grow and progress. The Angkar motif demonstrates the significance of mathematics through its symmetrical rhombus shape. A rhombus is a geometric shape that its perimeter and area formulas can describe. The circumference of a rhombus is calculated by multiplying the length of one side by 4. The area of a rhombus is found by multiplying half of one diagonal by the other. Figure 2 also displays motifs that resemble mathematical elements, such as lines and points. Geometry is a branch of mathematics that studies points and lines. Points are abstract mathematical concepts that lack a defined size or dimensions. A small circular mark typically represents dots and is often labeled with a name, typically written in capital letters. A line is a collection of points that includes more than one point. Points and lines are closely connected. A line is formed by connecting multiple points, meaning a line cannot exist without at least one point.

3.3 Production

The following information was obtained from interviews with the weavers.

3.3.1 Investment in Weaving Production Equipment

Non-mechanical looms are devices utilized for the production of woven textiles. The price of a single weaving machine is Rp. 8,000,000. The weaving machine has a lifespan of up to 20 years. The depreciation cost of the tool can be calculated as follows when it is used for 20 years:

20 years = 240 months
Tool depreciation costs = $\frac{Rp\ 8.000.000}{240}$ = Rp 33.000
Depreciation expense for one month: Rp 33.000

To determine the depreciation cost of a single fabric, given that 16 woven fabrics are produced in a month, the calculation is as follows:
Depreciation cost per month: Rp 33.000
Number of fabrics produced in a month: 16 fabrics
Tool depreciation cost =$\frac{Rp\ 33.000}{16}$ = Rp 2.000
So, the depreciation cost for one fabric is Rp 2.000

3.3.2 Yarn

Two types of yarn are used in this Sipirok woven fabric, namely Sinar Mas yarn and yamalon yarn for motifs and yamalon type bun yarn as the basis of the fabric.
Yarn for motifs:
Sinar mas: Rp 15.000 per yarn
Yamalon: Rp 20.000 per yarn
Bum yarn is used as the base of the fabric. The yarn used in one tool is 12 boxes, each containing six yarns. So, the costs incurred are:
Thread for fabric base:
Yamalon bum yarn: Rp 115.000 per box
The amount of yarn used: 12 boxes
The cost incurred: Rp 115,000 × 12 = 1,380,000
The number of fabrics produced from 12 boxes of bum yarn is 27 fabrics. So, the cost of bum yarn needed for one fabric is as follows:
Cost = $\frac{Rp\ 1.380.000}{27}$ = Rp 51.000
So, the cost of bum yarn needed to weave one woven fabric is Rp. 51.000.

3.3.3 Cost

The fixed cost of making this woven fabric is the cost of tool depreciation. To calculate the profit from one fabric, the depreciation cost for one fabric is Rp 2000.
Variable costs
Variable costs in making one fabric are as follows:
3 Sinar Mas yarn: 3 × Rp 15.000 = Rp 45.000
2 Yamalon yarn: 2 × Rp 20.000 = Rp 40.000
Bum yarn: Rp 51.000
Weaver's wage: Rp 70.000
The total cost of production or cost of goods manufactured (COGM) for one fabric is Rp 206.000

3.3.4 Selling Price

The selling price of woven fabric is:
Selling Price: COGM + % Expected profit × COGM
Selling Price: Rp 206.000 + 50 % × Rp 206.000
: Rp 206.000 + Rp 103.000
: Rp 309.000
If the weaver wants to get 50% of the profit, she must sell the woven fabric for Rp 309.000

3.3.5 Profit

The resulting profit is as follows:
Profit: Revenue - Total Cost of Production
Rp 309.000 – Rp 206.000
Rp 103.000
So, the profit a weaver gets from one fabric if the expected profit is 50% is Rp 103.000

3.3.6 Working Time

The length of a single completed woven fabric is 2.5 meters. Based on the findings of interviews conducted with weavers, it has been determined that they can produce 25 cm of woven fabric within one hour. The duration needed to produce 1 cm of fabric is as follows:

$$\text{Length of fabric in one minute} = \frac{60\ minutes}{25\ cm} = 2{,}4\ \text{cm/minute}$$

The fabric produced in one minute of work measures 2.4 cm in length.

The length of a single piece of fabric is 2.5 meters (250 cm) because the cloth production rate is 25 cm per hour. The total working time required to produce one piece of cloth is as follows:

$$\text{Time to weave one fabric} = \frac{250\ cm}{25\ cm} = 10$$

So, the time needed to work on one woven fabric with a length of 250 cm is 10 hours.

3.3.7 Marketing

The following is a sales report of woven fabrics in the last six years:

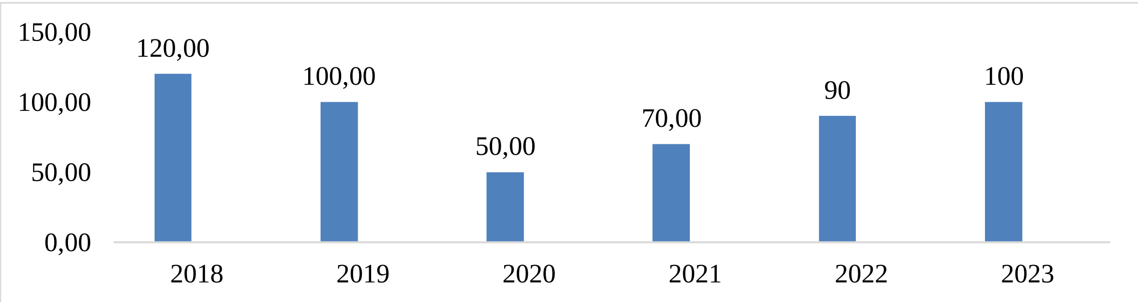


Figure 4. Sales Data of Woven Fabric in 2018-2023

The information obtained from the diagram is as follows:
The average of a data set (mean) is its average value. Divide the number of data by the average value when there is a lot of data [28].

$$m = \frac{sum\ of\ data}{Number\ of\ data}$$

Sum of data: 120 + 100 + 50 + 70 + 90 + 100 = 530
Number of data: 6

$$m = \frac{530}{6} = 88{,}3$$

Therefore, the average sales of woven fabrics from 2018 to 2023 each year is 88.3 fabrics.
The middle value in a sorted data set or as a measure of location is called the median.
Data: 120, 100, 50, 70, 90, and 100.

$$\text{Median} = \frac{50+70}{2} = 60$$

The median of the data above is 60.

The most frequently occurring frequency.
The method used to determine the mode of single data [29].
Data: 120, 100, 50, 70, 90, and 100.
The mode of the data above is 100
The highest sales of woven fabrics occurred in 2018, with fabric sales of up to 120 woven fabrics. The lowest sales of woven fabrics occurred in 2020, with only 50 woven fabrics sold.
According to Figure 3, the sales data for woven products in Padang Bujur Village in 2020 showed a continuous increase, with 120 woven fabrics in one year. However, in 2019, a pandemic led to a decrease in marketing sales in 2020. The pandemic persisted and even spread, resulting in a further decrease in marketing sales compared to the previous year. In 2021, the Covid-19 pandemic was ongoing, but the marketing sales of MSMEs have increased compared to before 2020. It was projected that the marketing of woven fabrics would continue to increase until 2023.
The production of Sipirok woven fabrics involves various mathematical concepts and activities, as evidenced by observations and interviews with weavers. Table 2 summarizes the connection between mathematical activities and Sipirok woven fabric [30].

Table 2. Mathematical Concepts and Activities in Sipirok Woven Fabric Production

No	Mathematical Concepts and Activities	Description
1	Geometry (two and three- dimensional spaces, points, and lines). Mathematical concepts found in tools and woven fabric motifs can be used as an example of geometry in everyday life in learning geometry.	Figures 2 and 3
2	Economic mathematics and social arithmetic. Mathematical concepts in mathematical economics and social arithmetic can be used as examples of applying knowledge learned in the life of trade and business, which may pique students' interest, especially if they are interested in doing business.	Production
3	Data presentation and central tendency. The utility of the mathematical principles discovered serves a function in learning mathematics by providing one example of presenting data in the form of a bar chart and how to find the average value, median, and mode.	Figure 4

According to the table above, the Sipirok woven fabric contains numerous concepts and mathematical activities, like:

1. Based on the inspection of the non-machine loom, the non-machine loom contains wooden parts shaped like cubes, and the rope within the loom is shaped like isosceles triangles. In addition, after examining multiple Sipirok woven fabrics, it has been observed that certain mathematical concepts and activities, such as creating flat shapes on the fabric's surface and featuring Angkar motifs that resemble rhombuses. Woven fabrics often feature motifs that resemble straight lines and dots.
2. Based on direct interviews with a weaver, it was observed that several mathematical concepts are present in the production process. One such concept is mathematical economics, which can be seen in the depreciation of tools, yarn prices, production costs, and selling prices utilized by the weavers. Furthermore, the mathematical principle of social arithmetic is utilized to calculate the profit derived from woven fabrics. Finally, the mathematical activity is related to the time it takes for weavers to weave.
3. From the development of woven fabric sales from year to year, the sales of woven fabric can be analyzed using mathematical concepts, specifically through bar charts

to present the data for each year. Furthermore, the mathematical concept of central tendency is used to calculate the bar chart's mean, median, and mode.

According to the interviews conducted with a weaver from Padang Bujur village, it was found that the loom used for weaving this type of fabric is a simple tool. The weaver starts with a wooden frame with geometric shapes like rectangles and blocks, each with a specific length. The shape of the rope used in the loom is that of an isosceles triangle. Woven fabrics commonly feature fabric motifs that exhibit geometric shapes, including lines, dots, and rhombuses. The motifs found in the context have distinct meanings, such as the rhombus motif commonly referred to as Pucuk Rebung. Calculating the cost for one sheet of woven fabric involves using mathematical economics and social arithmetic. This process includes determining depreciation costs and the overall cost required for producing one sheet of woven fabric, which is then used to determine the selling price of the fabric. The data presentation in bar charts illustrates the sales growth of woven fabrics from 2019 to 2023. Village leaders utilize these charts to assess the well-being of their residents. The application of mathematics in the real world, specifically in the process of making Sipirok woven fabric, positively impacts the learning of mathematics.

Ethnomathematics has several positive effects on mathematics education. Firstly, it enhances the enjoyment and relevance of learning mathematics, reducing the perception that math is difficult. Additionally, it allows students to explore their own culture and other cultures, fostering a greater appreciation for diverse mathematical practices. Lastly, ethnomathematics can support student learning by providing a valuable tool for understanding the concepts teachers teach [31].

4. CONCLUSION

The ethnomathematics research conducted in the Sipirok area of Padang Bujur village reveals that mathematical principles are present throughout the entire production process of traditional Sipirok woven fabrics. These principles encompass various aspects, including the tools utilized, motifs employed, and the financial and sales aspects that occur annually. According to the findings of this review, the weaving practice conducted by the Sipirok community group exhibits a strong connection to mathematical concepts. The author desires further investigation into Indonesian cultures that incorporate ethnomathematics, as numerous unexplored Indonesian cultural practices remain.

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